Labour Market Racial Discrimination in South Africa Revisited

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Abstract

Discrimination is a significant issue in labour market economics across developed as well as developing countries. In this paper we inquire the actual size of wage discrimination in the Republic of Soutn Africa, accounting for large differences in individual endowments. We apply the Oaxaca-Blinder decomposition as well as propensity score matching to adequately determine the role of discrimination in the wage gaps observed. Although the size of the absolute racial wage gap is enormous, amounting for more than 500%, the actual estimated effect non-attributable to other factors ranges between 45%-55%. This estimator, however, assumes homogenous discrimination across the wage distribution, while data suggest that there are significant educational, sectoral and occupational differentials. To account for these effects, we implement propensity score matching by finding "statistical twins" of the White population among the Black population, thus we demonstrate how wages differ between these groups in *comparable* labour market situations. Here too we find that wages for the White are on average approximately 30%, while the effects vary at quartiles of the wage distribution.

Keywords: discrimination, Oaxaca-Blinder decomposition, propensity score matching, Republic of South Africa, racial wage gap

JEL Codes: O12, J71, J08

INTRODUCTION

According to the basic theory of economics, in properly functioning markets wages of workers should reflect their marginal productivity. In reality, however, the phenomenon of wage differentials to workers performing same type of work with same output can be observed cross countries and labour market segments (Mortensen, 2005). One of the frequently raised explanations concerns the unobserved heterogeneity of workers transmitting into differences in productivity, while the productivity itself cannot be perfectly observed. On the other hand, discrimination may concern factors that actually drive productivity, e.g. access to education, to some segments of labour market or even the impact of parents' education and social position cannot be underestimated.

Republic of South Africa constitutes an especially interesting and policy-relevant case for its long history of apartheid and subsequent efforts – also legislative – to abolish any form of discrimination towards the Black members of the population. In this study, we use detailed micro-level data[1], to inquire the actual size of racial discrimination over a decade after the official abandoning of the apartheid system in 1994 and over three decades since the first egalitarian policies were implemented in 1974. In order to obtain reliable estimate of the wage discrimination, we apply both parametric (Oaxaca-Blinder decomposition) and non-parametric (propensity score matching) techniques, accounting for productivity drivers, e.g. education, age, gender, experience, environment, occupation and sector specific conditions.

We contribute to the literature in two major ways. Although both authorities and the research community continuously monitor labour market discrimination in South Affrica (e.g. Knight and McGrath, 1987; Moll, 1995; Mwabu and Schultz, 1998; Fallon and Lucas, 1998; Allason, Atkins and Hings, 2002 and Rospabe, 2002), there seems to be surprisingly little research into its determinantss. The applied techniques allow sheding some more light on this matter. Secondly, we provide reliable estimates of how the discrimination exhibits along the wage distribution. Namely, by carefully matching Whites to their "statistical twins" among the Black population we are able to determine the market compensation for *comparable* Blacks and Whites, which will enables an evaluation of the actual wage gap despite potential limitations in the access to the labour market.

The paper is structured as follows. Firstly, motivation and up-to-date findings are presented. Section II discusses the theoretical background, empirical strategy and data, while Section III conveys the findings. In the concluding section we suggest some directions for further research.

Section I. MOTIVATION AND LITERATURE FINDINGS

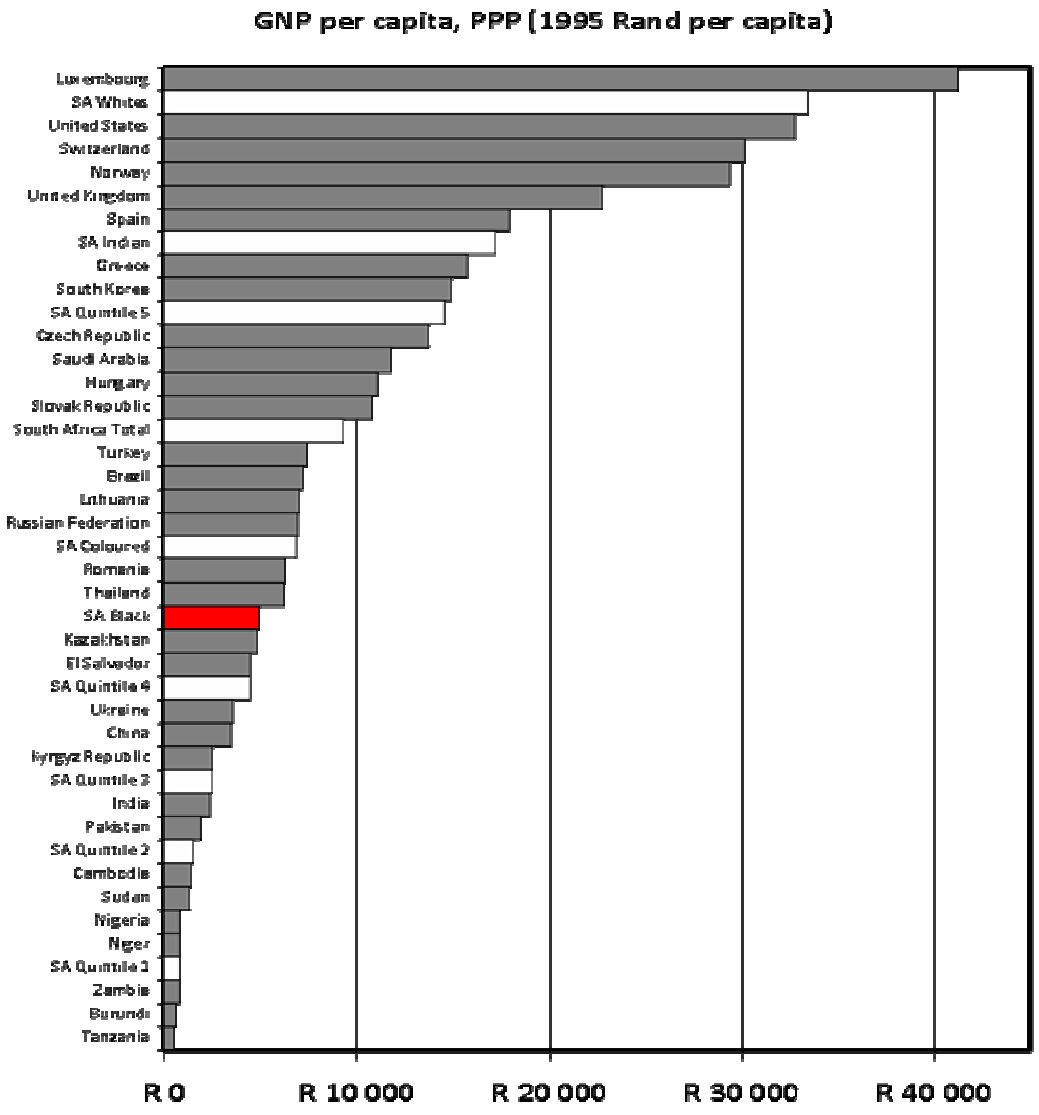
South Africa is rich in natural resources, for example it has a total of 49% of world's exports of gold, and 80% of Africa's supply coal. Also, it has a large area of high quality soils for agricultural use, which account for 75% of total area of the country. At the same time, its economy requires very differentiated skills, including workers with elementary capacities. The occupation which accounts for most individuals employed is the elementary worker, with almost one third of Blacks falling into this category, while for the White population it only stands for just above 4% of total employment. Other occupations with a significant share of Black workers comprise domestic workers, machine operators, and craftsmen as well as sales and services employees, each with share of ca. 10%. Interestingly, with almost 7 times more Blacks than Wites in the labour market, the latter are more numerous in absolute

[1] Labour Force Survey, Semptember 2006

numbers as managers. At the same time, almost 10% of Whites are employed as domestic or elementary workers and machine operators.

These discrepancies are reflected in labor market outcomes, namely the wages paid to differentitated labour market groups. Namely, there is a considerable differentiation in earnings between the racial groups in South Africa, Figure (1). In the dataset we use, the median income of a Black labour market participant (aged 15-65) is just over 12 000 ZAR. Within the Black population, the median average annual wage is 14 100 ZAR for males, and 8 900 ZAR for females. At the same time, the median annual income of White working adults aged 15-65 is ZAR 65,405. White males have a median annual income of ZAR 81,701 versus ZAR 52,392 for White females.

Figure 1. Per capita income differentiation in South Africa

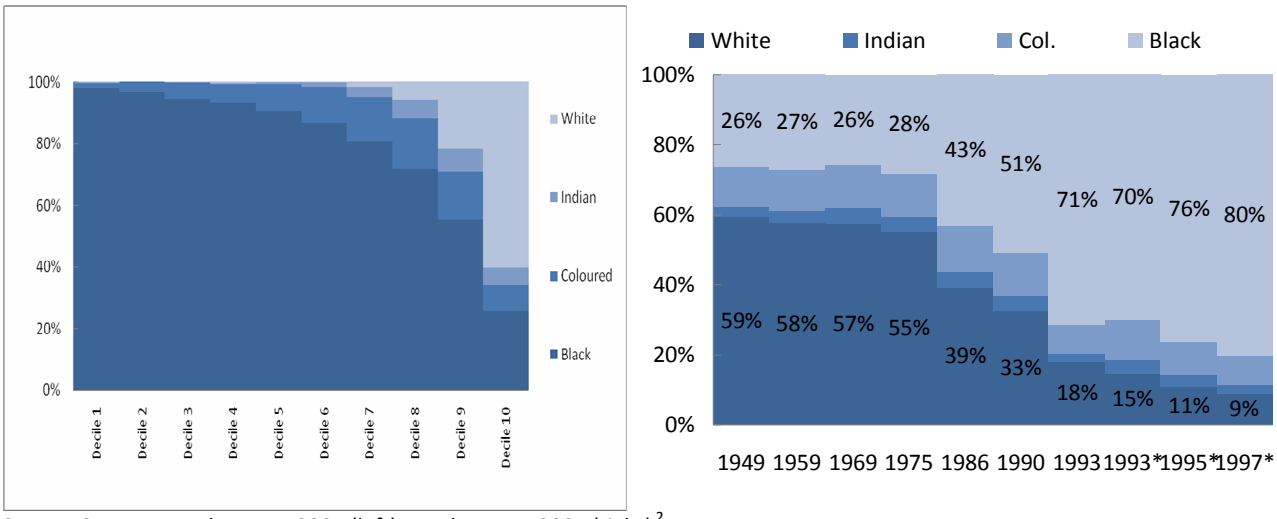


Source: after van der Berg, 2001, own selection of countries

Due to the history and the legacy of Apartheid, the distribution of income among society is still uneven despite numerous attempts from the government to combat it. Whites are highly

concentrated in the higher deciles of the population, and are virtually not present below the 8th decile. Indians experience a similar situation to Whites, while Coloured are rather evenly distributed. Blacks on the contrary are the worst off, with only 20% share in the 10th decile, and about 50% share in the 9th.

Figure 2: Race composition of deciles (2000) and social transfers



Source: Servaas van der Berg, 2004 (left) van der Berg, 2001 (right) [2]

The main policy tool, is the redistribution of income. However, according to Bromberger (Government policies affecting the distribution of income, 1940-80) the quality of the outcome is sometimes questionable. As of 1974, the priorities have been strongly shifted from Whites to Blacks. With the Whites accounting for about 15% of the population during the entire period, in the beginning of 1970s' the received almost 60% of total social spending. However, after the reform launched, in 1993 the level decreased to 15% which was equal to the share of Whites in the population, and continued to drop, falling below 10% in 1997.

Mwabu and Schultz (1998) explain the differences in wages across races in South Africa, accounting for differences in endowments, but solely by tracing the differentials in the lenght of education. They conclude, that the wage differencial in almost 50% is explained by differences in the duration of education of the nonwhite compared to white groups. They also suggest that except for quantity one should account for education quality, which significantly differs across the population groups[3].

Fallon and Lucas (1998) expand the research on discrimination considering it not only in terms of wage disparities, but also access to South African labour market, since the disparity in the incidence of unemployment by race was highly differentiated, with a 33.6% unemployment among black males, compared to 3.6% among white males (with national average at the time of 29.8%)[4]. The authors suggest that discrimination by race and barriers to mobility are important drivers of wage

[2] The * indicates that estimates were derived from survey data and fiscal data rather than race based fiscal data alone

[3] This assumption is supported by Moll (1992), who states that during nearly half of century of apartheid schools aimed at educating Whites received much more resources, and even after easing the racial separation system, in 1990, white schools received twice as much resources as black schools, which must have had an impact on the quality of education.

[4] They use the data of 1993.

differentials[5]. The reported premium for being White amounted to 25% just before the collapse of the racial separation system. This research too, however, resorts to only two factors (education and labour market status) as determinants of individual productivities.

Similar conceptual framework was delivered by Bhorat and Leibbrandt (1999), who present a model of earnings which is decomposed into three equations: participation, employment and earnings. The first equation includes key factors selecting participators such as education, gender, geography, age, household structure and household income. The employment equation includes most of the explanatory variables used in the participation equation; however, household structure and income are excluded as they influence the decision to seek work, but not the process of finding employment. The earnings equation is restricted to those who succeeded in obtaining employment[6].

Allanson, Atkins and Hinks (2002) compare wages reported before and after the fall of the apartheid, using data for 1995 and 1997 and decomposing the wage differencial into a part explained by observable productivity drivers and an unexplained part. According to the results is seems that the collapse of the apartheid has had little impact on the wage differentials, while the level of discrimination of Whites and Black between 1995 and 1997 tends to remain stable. On the other hand, when comparing the findings for 1980s (Knight and McGrath, 1987; Moll 1995) the racial premiums seem to have considerably decreased.

In a more descriptive approach, Rospabe (2002) attpemts to evaluate the governmental policies aimed at combating labour market discriminating between 1993 and 1999. Rospabe (2002) argues that the policies have been successful in combating discrimination in the access to the labour market, yet they remain without success in the area of occupational and wage discrimination. The results suggest that in 1993 22.7% of the wage differential was accounted for discrimination, and it has increased to 28.6% by 1999. Paper argues, however, that much of this differential may be attributed to the endowments discrepancies.

Contrary evidence is suggested by Klasen and Woolard (2009), who argue that strongly embedded cultural and opportunistic family strategies towards poverty and unemployment actually draw some of the unemployed away from employment opportunities, and thus lowers their employment prospects. They also find, by analyzing household surveys of 1993, 1995, 1998 and 2004 that this phenomenon is consistently strongly associated with being Black and being dislocated during apartheid.

Summarising, evidence on wage discrimination so far mainly resorted to static comparisons – in one point in time or across time – of the wage levels achieved by subpopulations, where the dissection variables usually included education and labour market status. We are not aware of any research that would take a comprehensive view on the determinants of individuals' productivities, frequently foregoing the role of interaction effects as well as – so to say – external conditions (eg. family, industry, occupation and region). On the other hand, the results are consistent in arguing that the wage discrimination persists at fairly comparable levels across 1990s, while these levels seem to be lower than in a previous decade. Finally, little is known about the currently observed labour market discrimination.

[5] Blacks are the group receiving a largest premium to education, however, this phenomenon is interpreted as diminishing discrimination, and not actually a premium.

[6] Similar approach was followed by Burger and Jafta (2006).

Section II. THEORETICAL BACKGROUND AND EMPIRICAL STRATEGY

In labour economics a wage is considered a compensation for a specific quantity of labour delivered to the employer. This compensation is being paid at a given wage rate and total quantity in a given period of time is based on the units of time that has been delivered to the employer. Although discrimination can manifest itself in many aspects (eg. the type and location of housing, education, acces to medical service, etc.) its most evident aspect are the differences in the way of treating subpopulations in the labour market.

In case of discrimination at the moment of entry into employment, two options are possible. Either a discriminated individual with identical skills is denied access to employment and is not hired, or a phenomenon of over-qualification/under-compensation occurs. In a simplest model, where only one good is being produced by a number of firms, and the only factor of production is labour, the entire supply of labour can be divided into equally productive workers differing only by an economically insignificant feature, like age, race, sex, religion, nationality, etc. In such a model discrimination implies that there is an economic agent with a negative valuation for *i* or positive valuation for *j*, regardless of which, the agent is willing to pay by sacrificing some share of the profit.

Discrimination on the labour market can be defined to exist, if the actual mean earnings of members of specific groups are not identical to the mean which would be observed in a perfectly functioning labour market, without discrimination.

$$\frac{w_i}{w_j} \neq \frac{\tilde{w}_i}{w_j} \tag{1}$$

Where RHS is the wage ratio in case of a not discriminating market and LHS corresponds to the actually observed ratio, where the main difficulty concerns providing a reliable counterfactual, that is the reliable estimation of RHS. This approach builds on a theory of Becker (1976) approach, arguing that in general equilibrium wage levels on the market must reflect the "tastes" for discrimination. In such case, the employer is not maximizing the profit, but instead, the utility function $U(\pi, i, j)$, yielding the profit function of the following form:

$$\pi = f(i+j) - w_i i - w_j j \tag{2}$$

where w_i and w_j are the wage levels of for individuals *i* and *j.* The employer, observing the marginal product of both types of labour, pays accordingly, but at a discriminating employer the wage paid to individuals *i* (w_i), has to comprise the surplus that the employer is willing to pay in order to decrease the quantity of *i* labour within the total employment. If marginal utility of a specific type of labour is negative, then the discrimination surplus coefficient of this group is positive and equals

$$d_i = -MR_{\pi' i} \tag{3}$$

$$MP_i = w_i + d_i \quad \text{and} \quad MP_j = w_j + d_j \tag{4}$$

where d_i is negative or equal to zero. Furthermore, if interchangeability of *i* and *j* labour is assumed ($MP_i = MP_j = MP_L$), (4) yields $w_i - w_j = d_i - d_j > 0$, so that equilibrium requires wages of labour *i* to exceed those of labour *j*.

Assuming that all firms on the market have identical utility functions, they will all employ same amount of *i* and *j* labour. Assuming that firms do not have identical utility functions but instead they all discriminate to a different degree and leaving capital excluded from the model, still the only factor which has an impact on the firms satisfaction is the *i*/*j* labour ratio. For discriminating firms the marginal rate of substitution of profits for *i* labour will be always negative for any given *i*/*j* ratio. For such firms, the ratio will present as follows:

$$\frac{i}{L} = \frac{d_j}{w_i - w_j} \text{ and } \frac{j}{L} = \frac{-d_i}{w_i - w_j} \tag{5}$$

Since firms with different ratios of W to B will be present on the market, the firm with the highest ratio of *i* to *j* will be the most discriminating one, and will experience the highest value of d_i. As a result the *i* workers will tend to aggregate in less discriminating firms, and *j* in the more discriminating ones. Discrimination is therefore costly, as it traffics the demand from labour to cost components. Also, the marginal productivity of labour is not identical for every firm, which makes the production inefficient.

Empirically, studies of wage discrimination date back to the 1960's, with the seminal work of Sanborn (1964) and subsequent inquiries into the nature of gender wage gap. Mincerian (1974) wage regression, corrected for self-selection bias by Heckman (1979) and combined with the decomposition approach suggested by Oxaca (1979) and Blinder (1979) created a tool enabling adequate measuring of the actual wage differentials. Adequate in this context should mean it accounts for all observable sources of individual productivity differences that are expected to be reflected in wages.

Under specific condition, the Mincerian model can be used to determine the prices and return rates of human capital investment. However, due to violations of the basic assumptions, such as unequal quality of schooling, different experiences other unobserved heterogeneity and not taking into consideration basic determinants of actual returns (such as indirect costs of schooling, taxes, risk attached to the length of the working period or uncertainty about future, returns to capital investments) the basic model cannot provide valid estimates of schooling. Some of these obstacles can be overcome with Heckman (1979) correction, which enables accounting for systematic differentiation vis-a-vis particular characteristics across agents. Consistent estimation of wage equation is crucial for adequate conclusions derived in a parametric technique employed in this paper, i.e. Oaxaca-Blinder decomposition, but the returns to education (estimators of education parameters in wage equation) may be incomparable if the actual underlying education differs.

To this end we adopt propensity score matching. Namely, in the matching procedure the there is no requirement concerning the relationship between the underlying determinant and a predicted variable. Namely, we only need that determinants are monotonically linked to the outcome variables while the differentiation variable (usually referred in the literature as "treatment" variable) needs to be independent of these determinants. The assumption of monotonicity does not require that the relationship is the same across compared groups. Nor is it necessary that the groups have comparable endowments or sizes.

With propensity score matching, the quality of estimation depends much on the data availability. In the case of this study, the pool for matching (the size of the control sample in the relation to the size of the analysed sample) is relatively large, so there is no need for sampling with replacement. We apply kernel estimates of propensity scores with the nearest neighbour matching,

following Heckman, Ichimura, Smith and Todd (1998). Alternatively, we could have used the oversampling technique. However, the choice of the oversampling magnitude is always arbitrary, while tenfold oversampling (as feasible in our sample) should not differ from the kernel approach in terms of statistical quality.

Although the set of variables is constrained – as in every study – we believe that relying on demographics (gender and age) as well as education, experience and individual (marital status, family variables) combinded with environment measures (occupation, industry and region) may be sufficient for the stability of propensity score matching approach and conformity with the conditional independence assumption. We verify this approach empirically by the use of t-tests, as suggested by Rosenbaum and Rubin (1983).

Summarising, we will pursue two independent approaches. In the first, we will estimate Mincerian wage equations with Heckman correction on two separate subpopulations of Whites and Black in the Labour Force Survey 2006. The obtained coefficients are necessary to implement the Oaxaca-Blinder (1973) decomposition, which should provide reliable estimate of an unexplained component of wage differentials, typically attributed to the discrimination. The variables used in the study will comprise age, gender, education, experience, occupation, industry, location and family variables (in terms of incentives, namely the marital status and the number of dependants). Naturally, relevant interactions shall be used. In the second approach, using the same set of explanatory variables, we will match Whites in the LFS to their "statistical twins" among the Black population. After matching, mean wage, hours worked and earnings will be compared. This exercise will not provide insights into the labour market situation of the whole Black population. On the other hand, for *comparable* Blacks and Whites the market compensation work will be available, which will enable the evaluation of the actual wage gap.

The South African Labour Force Survey is a household survey conducted twice every year and is designed to comprise as well the evolutions in the labour market. We use the wave from September 2006, which comprises data on approximately 67 000 adults in their working age (between 15 and 65) who live in over 30 thousands households across all provinces[7]. 77.3% of individuals are reported as Black and 6.38% as White. The crossing of labour market status with race is presented in Table 1.

Table 1. Labour market status and race in LFS Sept. 2006

Labour market status	Black population	White population	Total[8]
Outside LF	18 797	1 337	23 663
Employed	18 370	2 693	26 390
Unemployed	14 515	233	16 814
Total	51 682	4 263	66 867

Source: South African Labour Force Survey, September 2006

[7] Entire dataset is collected during face to face interviews, conducted by Stats SA interviewers. The entire questionnaire is divided in six sections and comprises account a total of 102 questions.

[8] The numbers do not add up in rows, because Indian and Coloured populations as well as "Other" are not reported.

Section III. EMPIRICAL ANALYSIS

Descriptive statistics demonstrate that although demographics are comparable across Black and White population, the average earnings and wages differ considerably, approximately five-fold. Also the standard deviation in the case of White population is much larger, suggesting that the upper side of the distribution is indeed widespread. Nonetheless, median wage and earnings in the case of both populations fall short of the mean (32.94 ZAR per hour in the case of White and 6.03 ZAR per hour in the case of Black), which should be treated as an indication of leftward skewness of the compensation distributions. The major difference naturally concerns the education (roughly four years more in the case of White population) and tenure (roughly two years shorter in the case of Black).

Table 2. Descriptive statistics

	Black population			White population		
Variable	**No of obs.**	**Mean**	**Std. dev.**	**No of obs.**	**Mean**	**Std. dev.**
Share of females	17907	0.464	0.499	2307	0.428	0.4949
Age	17909	38.24	11.30	2307	40.82	11.750
If head of household	17909	0.618	0.4859	2307	0.546	0.4979
If married	17909	0.479	0.499	2307	0.739	0.4388
No of children in household	17909	1.412	1.650	2307	0.675	0.9197
Household size	17909	4.236	2.916	2307	3.268	1.4755
No of years in education	17849	8.323	4.122	2295	12.37	1.8819
Employment experience	17849	23.91	13.360	2295	22.43	11.867
If employed	17909	0.999	0.0149	2307	1	0
Tenure	13652	6.592	7.858	1711	8.813	8.8489
Firmsize	17834	3.420	1.957	2288	4.044	1.6217
Earnings	17909	2185.6	3355.3	2307	9005.6	10638.29
Wage (hourly)	17863	12.26	20.195	2294	48.07	58.877

Source: SA LFS Sepmteber 2006.

Notes: Included in analysis but not reported are categorical variables: job type (permament, fixed period contract, temporary, casual, seasonal); occupation (legislators, senior officials and managers; professionals; technicians and associate professionals; clerks; service workers and shop and market salesmen; skilled agricultural and fishery workers; craft and related trade workers; plant and machinery operators and assembly workers; elementary occupations; domestic workers); skills (unskilled; semi-skilled; skilled); industry (agriculture, hunting, forestry, fishing; mining, quarrying; manufacturing; electricity, gas and water supply; construction; wholesale, retail; transport, storage and communication; financial, insurance and business services; community, social and personal services; private households); sector (domestic workers; informal; formal; subsistence agriculture; commercial agriculture; don't know; unspecified) and employer type (public, private, government enterprise).

Since these two subpopulations – as argued earlier – differ significantly with reference to industry and occupation and skills, the estimations need to include this variety, Neal (1993); Sunday and Pfuntner (2008). Also, tenure is an important determinant of potential earnings, especially if combined with the job type (20% of Black population reports temporary employment, while absolute majority of White – 93% – reports permament relationship with the employer; it is 64% for the Black population). Intuitively, workers will tend to gain skills and knowledge as they continue working for a particular employer, learning the procedures and mastering necessary skills, Williams (1991), O'Loughlin (1997). Moreover, since it is possible that workers of different races cluster in different industries, in can be also responsible for a part of what is assumed to be an actual pay gap. Another important aspect is that respondents do report employment in informal sector as well, which comprises – among others – domestic work, subsistence agriculture and commercial agriculture. Also, since anti-discrimination policies are easier to be monitored in government enterprises or in the case public employment, it seems relevant to incorporate this differentiation into analysis.

Table 3 presents the results. The first estimation includes provincial dummies in both selection and wage equations, whereas the second set of estimation contains it only in the selection equation.

The rationale behind such choice is that one may expect that labour market conditions may differ, potentially limiting employment opportunities in some provinces and thus forcing mobility. On the other hand, mobility – if unconstrained for both White and Black populations – should however drive wages to comparable levels, unless there is selectivity of sectors/industries across regions. Therefore, including the provincial dummies in the wage equation may actually potentially constrain the size of discriminatory effects. The sizes of the estimated coefficients do not seem to be largely affected by the inclusion of provincial dummies. Nonetheless, the hypothesis of geographical clustering of industries finds confirmation in data, since the constant in the wage equation for the Black population is considerably higher in the estimation without provincial dummies.

Table 3. Wage regression results

Variables	Black population Equation		White population Equation		Black population Equation		White population Equation	
	Wage	Selection	Wage	Selection	Wage	Selection	Wage	Selection
Female	-0.201***	-0.229***	-0.0661	-0.181***	-0.097***	-0.229***	-0.088*	-0.181***
	(0.0190)	(0.0141)	(0.0479)	(0.0562)	(0.0170)	(0.0141)	(0.0479)	(0.0562)
Age	0.0093***	0.015***	0.0058**	-0.018***	0.0020**	0.015***	0.005**	-0.02***
	(0.00116)	(0.00069)	(0.00293)	(0.00221)	(0.00092)	(0.00068)	(0.00255)	(0.0022)
Age squared	-0.001***	-0.001***	-0.005***	-0.005***	-0.001***	-0.001***	-0.001***	-0.001**
	(0.00012)	(0.00012)	(0.00002)	(0.00002)	(0.00012)	(0.00012)	(0.00002)	(0.0002)
No of children	-0.040***	-0.11***	0.023	0.055*	0.027***	-0.11***	0.032	0.055*
	(0.00853)	(0.00433)	(0.0201)	(0.0296)	(0.00601)	(0.00433)	(0.0203)	(0.0296)
Education	0.0717***	0.081***	0.129***	0.179***	0.035***	0.081***	0.144***	0.179***
	(0.00538)	(0.00203)	(0.0234)	(0.0129)	(0.00340)	(0.00203)	(0.0186)	(0.0129)
Head of household	0.236***	0.862***	0.301***	0.782***	-0.308***	0.862***	0.346***	0.782***
	(0.0582)	(0.0161)	(0.102)	(0.0628)	(0.0337)	(0.0161)	(0.0809)	(0.0628)
Married	0.192***	0.589***	0.165*		-0.083***	0.589***	0.191**	
	(0.0330)	(0.0234)	(0.0944)		(0.0217)	(0.0234)	(0.0764)	
Tenure	0.013***		0.009***		0.014***		0.0117***	
	(0.0009)		(0.0022)		(0.0009)		(0.0023)	
Provincial dummies	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Job type dummies	Yes		Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes		Yes	
Occupation dummies	Yes		Yes		Yes		Yes	
Employer type dummies	Yes		Yes		Yes		Yes	
Marital status dummies		Yes		Yes		Yes		Yes
Lambda		0.316***		-0.0125		-0.624***		0.0739
		(0.0974)		(0.218)		(0.0517)		(0.162)
Constant	1.135***	-1.551***	1.549**	-2.143***	3.986***	-1.551***	0.845**	-2.144***
	(0.198)	(0.0476)	(0.724)	(0.173)	(0.134)	(0.0476)	(0.340)	(0.173)
Observations	46 746	46 746	3 245	3 245	46 748	46 748	3 247	3 247

Source: SA Labour Force Survey, September 2006
Notes : ***, **, * denote statistical significance at 1%, 5% and 10% levels, respectively.

Most variables have intuitive signs and traditional magnitudes. Interestingly, among the White population the inverted U shape pattern of age-wage relationship is steeper, but this effect is probably attributable to (i) more education in youth and (ii) more secured retirement revenues. Also, being married is insignificant among the White, while gender is only marginally significant in the wage equation. On the other hand, in the selection equation gender has comparable magnitude for both Black and White population. An important difference concerns the size of lambda coefficient. It is

insignificant in the case of White population, which suggests that selection into employment has no systematic character – as opposed to the Black population.

The estimated equation enables the implementation of the Oaxaca-Blinder decomposition, which provides a reliable estimate of the "unexplained" wage differential, which is traditionally attributed to the discrimination. The decomposition technique takes the average endowment differences between the groups analyzed and weights them by the high wage workers estimated coefficient. The differences in the estimated coefficients are weighted by the average characteristic of the low wage workers, predicting what their wages would be in case of absence of discrimination. Conventionally, the high-wage group's wage structure is regarded as the "non-discriminatory norm", that is, the reference group.

The first set of estimations (with provincial dummies) produced the estimator of wage gap of approximately 176%, but only 48.6% of this differential is attributable to racial discrimination (detailed results available in Appendix). In the second set of estimations the estimated size of discrimination reaches 219% with 59.7% unexplainable by individual determinants. These numbers are high when comparated to earlier estimations usually reaching a consensus of 25%-35% racial wage gap. However, we have comprised in the estimation all of the effects that have typically been set aside in estimations, namely industrial, occupational sectoral and employer characteristics that to large effect are – and should be – reflected in wages. It seems that Black workers cluster in industries and occupations which provide lower wages. This may be either an effect of lower productivity of labour in these enterprises or a result of Black workers' overqualification. Constrained in access to other jobs, they are forced to assume positions which do not make use of the individual productivities. Importantly, if this hypothesis was true, a kind of vicious circle could emerge as a result: Black workers not being able to benefit from educational and skill investments will forego this effort in the future (either in own efforts to improve skills or by directing their children towards premature exit from the educational system).

To verify whether the discrimination patterns are homogenous across the wage distribution we have implemented propensity score matching. Inquiring the overall situation of the Black population in the labour market is flawed by the fact that this group is largest by numbers. Therefore, a reliable counterfactual wages earned by White population may actually be misleading. Consequently, we adopted the opposite approach. Namely, taking the labour market status of the White, as it is – we have inquired whether "identical" Black workers earn comparable income on their work. The results are presented in Table 4.

The average hourly wage in the Black population amounts to 13.90 ZAR and 44.15 ZAR in the White population. The differential seems over threefold. However, after the implementation of matching (i.e. selecting from the Black population only such individuals that match the White population with respect to age, education, gender, industry, occupation, sector, family situation and their relevant interactions), the average hourly wage of the Black population grows to 33.59 ZAR. Although still significantly lower than in the White population (t-statistic of the differential is significant), Black workers receive only 30% lower hourly compensation for comparable work. The word "only" is naturally akward, but this is the lowest average estimate of discrimination obtained in this study.

Table 4. Propensity score matching results.

Variable	Subsample	White population	Black population	Difference	S.E.	T-stat
	Total sample					
Wage	Total	44.15	13.90	30.25	0.6191	48.79***
	Matched	44.15	33.59	10.56	1.8494	5.71***
Earnings	Total	8098.99	2524.52	5574.47	109.31	51.00***
	Matched	8098.99	6103.33	1995.66	333.13	5.99***
Hours worked	Total	43.98	45.26	-1.279	0.3606	-3.55**
	Matched	43.98	45.23	-1.252	0.5420	-2.31**
No of individuals		1 686	13 5664			
	Below median					
Wage	Total	18.34	3.636	14.71	0.1161	126.67***
	Matched	18.34	4.046	14.30	0.3313	43.15***
Earnings	Total	3537.82	752.06	2785.76	24.907	111.85***
	Matched	3537.82	898.23	2639.58	73.226	36.05***
Hours worked	Total	45.43	48.47	-3.035	0.5789	-5.24***
	Matched	45.43	52.87	-7.438	1.9523	-3.81***
No of individuals		858	5 824			
	Above median					
Wage	Total	70.94	22.49	48.45	1.0351	46.80***
	Matched	70.94	46.49	24.45	2.9622	8.25***
Earnings	Total	12830.66	4053.09	8777.63	181.92	48.25***
	Matched	12830.66	8392.34	4438.32	534.08	8.31***
Hours worked	Total	42.45	43.78	-1.336	0.4038	-3.31**
	Matched	42.45	44.05	-1.6058	0.6532	-2.46**
No of individuals		827	7 212			

Source: SA Labour Force Survey, September 2006, own calculations

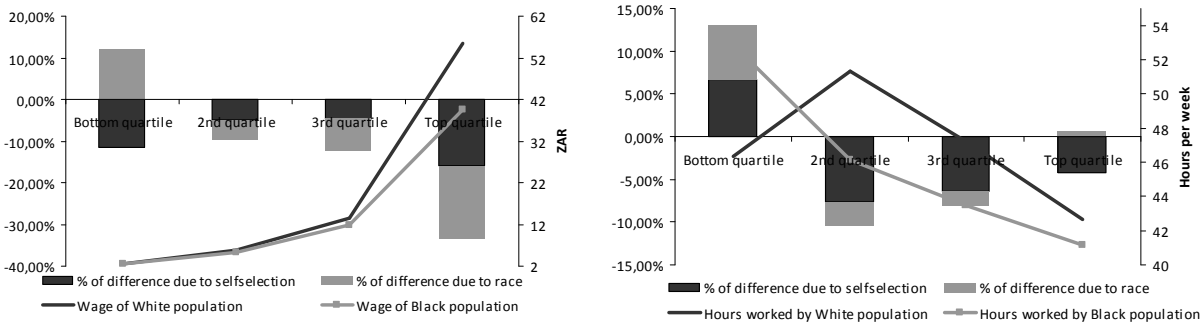
Since in both White and Black population the median income fell short of mean, we have performed matching in subsamples of below and above median wages. These results still demonstrate even more forcefully that discrimination is a phenomenon exceeding far beyond the concept of mean compensation. Namely, in both subsamples relative differences between the earnings of the White and the Black population are much larger than in the total sample considered together. Namely, 18.34 ZAR vis-à-vis 4.05 ZAR make approximately a fivefold differential (with Black population working considerably longer hours), while 70.94 ZAR vis-à-vis 46.49 ZAR makes it roughly twofold. Importantly, in the above-median subsample matching reduces the size discrimination by half, which shows the extent to which racial wage gap may be mismeasured.

To comprehend better where the phenomenon of wage differentials is greatest, we have repeated the exercise of subsampling along the wage distribution for quartiles. The results are presented by Figure 4. The bars (measured on the left axis) signify the share of self-selection and discrimination in the overall differential (negative values imply that this effect increases the differential), while the lines (measured on the right axis) demonstrate the average wages across each of the quartiles (detailed results available in the appendix). To facilitate tracing the interplay between hours worked and hourly compensation, we present both.

Clearly, differentials within the quartiles of the wage distribution are lower than when median was concerned. The ratio is highest in the top quartile amounting to roughly 40% when raw data are considered and 18% after matching. On the other hand, differential grows between third and fourth quartile of the wage distribution, whereas it is magnified by both self-selection and racial wage gap. This implies that at higher skill – and compensation – levels discrimination plays a larger role. This is however conditional on obtaining better education and a good job, which already may be subject to discrimination. With the exception of the bottom quartile, White employees seem to work longer hours, but after matching the difference is no longer statistically significant.

The results reveal that at the bottom quarter there is virtually no difference between hourly compensations, while the redistribution policies seem to work adequately, since household revenues among the Black population are even somewhat higher than among the White. Still, in the whole sample there were only 22 White workers and over 1 800 that fall into this quartile. In the second quarter, although there is a statistically significant difference in hourly earnings, after matching this discrepancy disappears. Consequently, one may state that if Black workers receive lower compensations, it is due to shortage of for example skills. Unfortunately, as we argued earlier, this may also be an effect of geographical clustering of industries generally offering lower compensations.

Figure 4. Propensity score matching results for quartiles of the wage distribution.



Source: SA Labour Force Survey, September 2006, own calculations. Hourly wages in left panel and hours worked per week in the right panel.

Summarising, although in each quarter the matching procedure reduces the wage differential considerably, it is clearly generated by both self-selection (lower educational attainments and skills among the Black population) and racial discrimination. In fact, in the top quartile, the negative contribution of racial effects is larger both than that of self-selection and than in other quarters.

CONCLUSIONS

Since the failure of the apartheid system and its abolishment, South Africa has been striving to provide equality to all citizens, regardless of race. This includes policies concerning equal access to education, medical care, public services or an existence of non discriminating labour market. Implementation is not a simple issue, however. As this paper points out, there is still a lot to be achieved. The results of the model employed in the research lend support to the statement that earnings differentials in South Africa are still considerable, while the novel methodology yields the estimators of racial wage gap of 30%-55% range. Totally, roughly 40%-55% of the differential is due to unequal endowments and potentially clustering the employment of Black workers in particular occupations and industries. These too may partly follow from discriminatory conditions; especially in as far as access to high quality educations is concerned.

There are many legal instruments to constrain racial discrimination in the labour market. These include wage setting practices, codes of best practices, controlling the corporate employment practices, fostering the merits and strength of the trade unions, etc. Many – if not all – of these instruments are being implemented in South Africa. Nonetheless, relatively large scale discrimination persists together with very high income differentials.

Discrimination – for whatever reason – is present in practically all labour markets, including the developed ones. However, the case of South Africa is special and requires better understanding. In this paper we have used micro-level data and implemented novel empirical tools to inquire adequately the size of discrimination. The actual size estimated with the use of Oaxaca-Blinder decomposition of the differential non-attributable to measurable individual factors ranges between 45%-55%. To circumvent the demanding assumption of homogenous discrimination across the wage distribution, we have implemented propensity score matching, demonstrating how wages differ between the Black and White workers in *comparable* labour market situations. Here too we find that wages for the White are on average approximately 30% higher, while the effects vary at quartiles of the wage distribution.

Unfortunately, although we use an extensive data set of over 60 000 individuals, in the most interesting bi-sections (like in the case of wage distribution quartiles) we were able to identify only few members of the control group. Moreover, since these are survey data, we cannot be sure if the representativeness vis-à-vis few characteristics at the same time may be guaranteed (like the intersection of industry, occupation, province and race). Therefore, it seems that more data – and subsequently more research – is necessary to properly comprehend the nature of discrimination in South Africa. Without this comprehension, one is unable to introduce new, nor modify the existing instruments that aim at alleviating the racial discrepancies. The perfect data set would be general (e.g. national census) and needs to comprise data on parrents educational attainment, parents labour market status as well as potentially labour market history of the individuals. Only then will it be possible to verify the hypotheses concerning the nature of discrimination prevalence in South Africa.

At the same time, intensive research is necessary into the size and nature of the pre-labour market discrimination in South Africa, mainly the role of social nets and educational system. Bariers to labour market entry may actually couple with barriers in access to education or mobility, aggravating the disparities. For example, despite free higher education, enrollment of Black students is constrained by large costs of transition from rural to urban areas. Other barriers – e.g. knowledge of wages and labour market conditions beyond one's residence – may be more experienced more severely by some groups in the population. Also, instruments targeting the poverty alleviation – namely social transfers – may have adverse impact in terms of incentives to some. Together with the anti-discriminatory legislation all these instruments constitute a system. Its coherenece is crucial for combating discrimination and helping individuals and communities deprived by apartheid get out of the poverty trap.

BIBLIOGRAPHY

Allanson P., Atkins J, Hinks T., "*No End to the Racial Wage Hierarchy in South Africa?*", Review of Development Economics, 2002

Becker G., "*Economics of Discrimination*" The University of Chicago Press, 1957

Bhorat H., Kanbur R. "Poverty *and Policy in Post-apartheid South Africa*" HSRC Press, 2006

Bhorat H., Leibbrandt M. , "*Modelling Vulnerability and Low Earnings in the South African Labour Market"* Development Policy Research Unit, University of Cape Town 1999

Boddy-Evans A., "*Apartheid Legislation in South Africa*", 2003

Bromberger N., "*Government policies affecting the distribution of income, 1940-80*" Public Policy Perspectives, 1982

Burger R., Jafta R., "*Returns to Race: Labour Market Discrimination in Post-Apartheid South Africa"* Stellenbosch University, Department of Economics 2006

Chamberlain D., Van der Berg, S., "*Earnings functions, labour market discrimination and quality of education in South Africa*" Stellenbosch University, Department of Economics, 2002.

Dias R., Posel D., "*Unemployment, Education and Skills Constraints in Post-Apartheid South Africa*" University of KwaZulu-Natal, 2007

Fallon P., Lucas R., "*South African Labor Markets, Adjustments and Inequalities*" World Bank Southern Africa Department., 1998

Fuchs V., "*Differences in Hourly Earnings between Men and Women*", Monthly Labor Review, 1971

Heckman J.J., "*Sample Selection Bias as a Specification Error*" Econometrica vol.47, 1979

Heckman J.J., Lochner L.J., Todd P.E. "*Fifty Years of Mincer Earnings Regressions*" NBER Working Paper No. W9732 , 2003

Klasen, S and Woolard, I. "*Surviving Unemployment without State Support: Unemployment and Household Formation in South Africa*", Journal of African Economies, Oxford University Press, vol. 18(1), pages 1-51

Mincer J., "*Investment in Human Capital and Personal Income Distribution*",. Journal of Political Economy, 1958

Moll P.G., "*Quality of Education and the Rise in Returns to Schooling in South Africa*" Economics of Education Review vol. 11, 1992

Mortensen, D., "*Wage Dispersion: Why Are Similar People Paid Differently*" Cambridge, MIT Press, 2005

Mwabu G., Schultz P., "*Wage Premia for Education and Location by Gender and Race in South Africa*" Economic Growth Center, Yale University Working Paper 785, 1998

Neal D., "*Supervision and Wages across Industries*", Review of Economics and Statistics, 1993

O'Loughlin M.B., "*Gender, Tenure and Wages*" Wyoming Labor Force Trends, August 1997

Oaxaca R., "*Male-Female Wage Differences in Urban Labor Markets*" International Economic Review, 1973

Rospabe S., "*How did Labour Market Discrimination Evolve After the End of Apartheid?*" South African Journal of Economics vol. 70, 2002

SA Government Gazette No. 29610

Sanborn H.,. "*Pay differences between men and women*" Industrial and Labor Relations Review, 1964

Simkins S., "*On the durability of South African inequality"* Input paper for Macarthur Network on Inequality and Poverty, Princeton University, 1998

South African Statistical Office, Mid-year population estimates, South Africa: 2007

Sunday K., Pfuntner J., "*How widely do wages vary within jobs in the same establishment?"* Monthly Labor Review , February 2008

Tilton D.,"*Creating an "Educated Workforce": Inkatha, Big Business, and Educational Reform in KwaZulu*" Journal of Southern African Studies., 1992

Van Der Berg S., Louw M., "*Changing Patterns Of South African Income Distribution: Towards Time Series Estimates Of Distribution And Poverty*," Stellenbosch University, Department of Economics Working Pape, 2004

Van der Berg, S., Megan L., Ronelle B., "*Post-Apartheid South Africa: Poverty and Distribution Trends in an Era of Globalization*" World Institute for Development Economic Research Working Research Paper RP2007/57 , 2007.

Williams N., "*Reexamining the Wage, Tenure and Experience Relationship*", The Review of Economics and Statistics, Aug. 1991

APPENDIX I. OAXACA-BLINDER DECOMPOSITION

Summary of decomposition results (as %) for the estimation with the provincial dummies

Amount attributable:	134.7
- due to endowments (E):	90.5
- due to coefficients (C):	44.2
Shift coefficient (U):	41.4
Raw differential (R) {E+C+U}:	176.1
Adjusted differential (D) {C+U}:	85.6
Endowments as % total (E/R):	51.4
Discrimination as % total (D/R):	48.6

Summary of decomposition results (as %) for the estimation without the provincial dummies

Amount attributable:	188.3
- due to endowments (E):	88.4
- due to coefficients (C):	99.9
Shift coefficient (U):	31.2
Raw differential (R) {E+C+U}:	219.6
Adjusted differential (D) {C+U}:	131.1
Endowments as % total (E/R):	40.3
Discrimination as % total (D/R):	59.7

APPENDIX II. PROPENSITY SCORE MATCHING BY BLACK POPULATION WAGE DISTRIBUTION QUARTILES

Variable		White population	Black population	Difference	S.E.	T-stat
	Bottom quartile					
Wage	Total	2.49	2.51	-0.015	0.197	-0.07
	Matched	2.49	2.84	-0.341	0.292	-1.17
Earnings	Total	521.57	579.70	-58.12	55.33	-1.05
	Matched	521.57	671.42	-149.84	96.43	-1.55
Hours per week	Total	46.36	52.88	-6.51	3.61	-1.80
	Matched	46.36	49.55	-3.18	6.80	-0.47
No of individuals		22	1 819			
	2nd quartile					
Wage	Total	5.92	5.38	0.541	0.125	4.31
	Matched	5.92	5.66	0.269	0.199	1.35
Earnings	Total	1317.22	1075.14	242.08	44.24	5.47
	Matched	1317.22	1270.76	46.46	86.59	0.54
Hours per week	Total	51.34	46.15	5.20	1.719	3.02
	Matched	51.34	49.99	1.36	3.22	0.42
No of individuals		73	3 870			
	3rd quartile					
Wage	Total	13.38	11.86	1.518	0.181	8.39
	Matched	13.38	12.44	0.9425	0.309	3.05
Earnings	Total	2716.72	2239.97	476.75	49.13	9.70
	Matched	2716.72	2505.64	211.08	88.04	2.40
Hours per week	Total	47.22	43.50	3.7167	0.718	5.17
	Matched	47.22	46.45	0.7515	1.201	0.63
No of individuals		338	3 593			
	Top quartile					
Wage	Total	55.41	39.61	15.79	1.22	12.93
	Matched	55.41	47.09	8.32	2.42	3.43
Earnings	Total	10 079.02	6885.78	3193.25	217.69	14.67
	Matched	10 079.02	8596.31	1482.71	424.26	3.49
Hours per week	Total	42.63	41.19	1.448	0.339	4.27
	Matched	42.63	42.95	-0.315	0.602	-0.52
No of individuals		1 253	2 930			

Source: SA Labour Force Survey, September 2006, own computations